DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 11/04/2009 have been fully considered but they are not persuasive.

2. The applicant argues (see pages 8-9) regarding the amended **claim 9** that none of the cited references teaches the limitations as claimed. The examiner respectfully disagrees. **Maeda et al.** as modified by **Kim et al. and Sai et al.** teaches a manufacturing method of an array substrate for a liquid crystal display device as claimed except for the first and second copper compound layers including nitrogen. **Ishikura et al.** teaches the first and second copper compound layers (11) including nitrogen (see at least column 8, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper compound layers.

3. The claim language therefore does not patentably distinguish over the applied reference[s], and the previous rejections are maintained.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 9-11 and 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Maeda et al. (US 2001/0029054)** in view of **Kim et al. (US 6,091,466)** and **Sai et al. (JP 2000-165002)**; further in view of **Ishikura et al. (US 6,219,125)**.

6. Regarding **claim 9**, **Maeda et al.** (figure 6) discloses a manufacturing method of an array substrate for a liquid crystal display device, comprising:

- forming a first copper compound layer (1a; see at least paragraphs 0046 and 0080) directly on a substrate;
- forming a first copper layer (1b) directly on the first copper compound layer;
- forming a gate line and a gate electrode by etching the first copper compound layer and the first copper layer (see at least paragraph 0053), wherein a top surface of the first copper layer has a narrower width than a top surface of the first copper compound layer;
- forming a gate insulating layer (3) on the gate line and the gate electrode;
- forming a forming an active layer (4) on the gate insulating layer over the gate electrode;
- forming an ohmic contact layer (5) the active layer;
- forming a second copper compound layer (6a; see at least paragraph 0081) directly on the ohmic contact layer;
- forming a second copper layer (6b) on the second copper compound layer directly on the ohmic contact layer;
- forming a data line, a source electrode, a drain electrode (6, 7) by etching the second copper compound layer and the second copper layer on the ohmic contact layer, wherein the data line crosses the gate line, the source and drain electrodes over the gate electrode;

- forming a passivation layer (10) on the data line, the source electrode, the drain electrode and the island-shaped metal layer, the passivation layer having a first contact hole exposing the drain electrode;
- forming a pixel electrode (11) on the passivation lager, the pixel electrode connected to the drain electrode through the first contact hole and connected to the island-shaped metal layer through the second contact hole,
- wherein the first copper compound layer helps to increase adhesion between the first copper layer and the substrate, and the second copper compound layer helps to prevent a chemical reaction between the second copper lager and the silicon component of the ohmic contact layer.

Please note that the claims are directed to apparatus which must be distinguished over the prior art in term of structure rather than functions [MPEP 2114]. Hence, the functional limitations of "*the first copper compound layer helps to increase adhesion between the first copper layer and the substrate, and the second copper compound layer helps to prevent a chemical reaction between the second copper lager and the silicon component of the ohmic contact layer*" which are narrative in form have not been given any patentable weight. In order to be given patentable weight, a functional recitation must be supported by recitation in the claim of sufficient structure to warrant the presence of the functional language. See In re Danley, 120 USPQ 528, 531 (CCPA 1959).

7. **Maeda et al.** is silent regarding forming the first and second copper compound layers including nitrogen; the island-shaped metal layer; and the thickness of the copper layer and copper compound layer.

8. **Ishikura et al.** teaches the first and second copper compound layers (11) including nitrogen (see at least column 8, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the

method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper compound layers.

9. **Kim et al.** (in at least column 2, lines 50-55, figures 4-6B) teaches an island-shaped metal layer (151) is simultaneously formed with the source and drain electrodes; the island-shaped metal layer is disposed over the gate line (113); the passivation layer (137) having a second contact hole (181) exposing the island-shaped metal layer; and the pixel electrode (141) connected to the island-shaped metal layer through the second contact hole. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the storage capacitor electrode as taught by **Maeda et al.** in order to increase the storage capacitance of the unit pixel and simplify the manufacturing process. Therefore, **Maeda et al. as modified by Kim et al.** teaches an island-shaped metal layer by etching the second copper compound layer and the second copper layer on the ohmic contact layer.

10. In addition, **Sai et al.** (drawing 7) teaches the first copper layer (2000 a; see at least paragraph 0047) is thicker than the first copper compound layer (50-500 A; see at least paragraph 0009). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the thickness of the copper and copper compound layers in order to improve the acid resistance over moisture, and decrease the manufacturing costs.

11. Regarding **claim 10**, **Maeda et al.** as modified by **Kim et al.** and **Sai et al.** discloses the limitations as shown in the rejection of **claim 9** above. However, **Maeda et al.** as modified by **Kim et al.** and **Sai et al.** is silent regarding forming the limitations of **claims 10-11 and 13-14**. **Ishikura et al.** teaches the first and second copper compound layers (11) are formed in a processing chamber where a gas flows that chemically combines with the copper; the gas is N.sub.2

(see at least column 8, lines 10-15); the first and second copper layers (12) are formed in a processing chamber where a gas flows that does not chemically combine with the copper; the gas is Ar (see at least column 8, lines 16-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the copper and copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper and copper compound layers.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lauren Nguyen whose telephone number is (571) 270-1428. The examiner can normally be reached on M-Th, 7:30-6:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. N./
Examiner, Art Unit 2871

/David Nelms/
Supervisory Patent Examiner, Art Unit 2871